Myometrial Reconstruction Following Myomectomy

An Improved Technique Utilizing Overlapping Laminations of Myometrium to Reinforce the Uterine Closure

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• **A simple, but much improved technique of myometrial reconstruction following myomectomy makes the line of closure much stronger, lessening the risk of uterine rupture at subsequent pregnancy.**

Basically, three laminations of myometrium are utilized to cover the endometrial wound with three layers of intact uterine muscle.

The first myometrial layer is brought from above downward and coapted to the inner third of myometrium of the anterior uterine wall.

The second lamination of uterine muscle is developed from the middle and outer thirds of the anterior uterine wall, stretched over the endometrial wound, then securely anchored to the base of the salvaged hood of myometrium that covered the nest of fibromyomata.

The third myometrial lamination consists of the aforementioned hood of uterine muscle, which is drawn forward to help form a new portion of the anterior uterine wall.

Approximately three-fourths of patients who had full term pregnancy after this procedure were delivered vaginally.

BY AN IMPROVED TECHNIQUE for myometrial reconstruction after myomectomy, the closure of the uterine operative wound is very strongly reinforced, making subsequent pregnancy decidedly less likely to cause rupture at the site. Indeed, in selected cases vaginal delivery can be the management of choice.

The chief indication for myomectomy is preservation of the child-bearing function of the uterus. In general, surgical intervention is indicated when fibromyomata become symptomatic by causing cyclic menorrhagia, menometrorrhagia or intermenstrual bleeding. Further, the majority of gynecologists believe that operation is indicated if the uterus is greater than the size of three months' gestation. In general if the woman is under 41 years of age, particularly if she is childless, myomectomy is the procedure of choice for dealing with fibromyomata. Each case, however, must be individually assessed.

The principal contraindications to myomectomy are: (1) Malignant disease anywhere in the genital tract; (2) poor operative risk; (3) patient over 41 years of age; (4) total inability to conceive, such as hopelessly irreparable tubo-ovarian disease.

Since the techniques for myomectomy have been detailed elsewhere,[2,4,5] only salient points which are often not emphasized are presented.

I. Preoperative Management

A. *Preliminary Evaluation of Tubo-ovarian Status*

Whenever possible, and particularly when the woman is childless, a preliminary tubal insufflation should be performed. In addition, some physicians carry out hysterosalpingography, using an aqueous medium.[4] In this manner, a submucous tumor may be outlined. If the myomata are not too large and there is question as to whether the tubes and ovaries are normal, a preliminary transvaginal pelvioscopy[4] (culdoscopy) may be of great value.

B. *Orientation of the Patient and Her Husband*

Preoperatively, the patient should be well oriented as to the proposed surgical procedure, preferably with illustrations such as those in Rubin's[4] excellently illustrated monograph. Whatever fears, superstitions and erroneous ideas she may have, must be brought to light and overcome. Frank, honest discussion with both husband and wife before the operation cannot be emphasized enough.

The woman and her husband must both be apprised of these facts: (1) Myomectomy may not clear the way for future pregnancy; (2) new fibromyomata may develop at a later date; (3) hysterectomy may become necessary if malignant disease is found or future pregnancy is deemed absolutely impossible.

C. *General Health Measures*

Since the procedure is almost always an elective one, local vaginal conditions such as endocervicitis or vaginitis should be eradicated before operation.

D. *Time for Operation*

The best time for operation is in the immediate postmenstrual period.

II. Operative Management of Myomectomy

A. *Preliminary Dilatation and Curettage*

Some surgeons recommend that diagnostic dilatation and curettage be done to rule out malignant

Presented before the Section on Obstetrics and Gynecology at the 90th Annual Session of the California Medical Association, Los Angeles, April 30 to May 3, 1961.

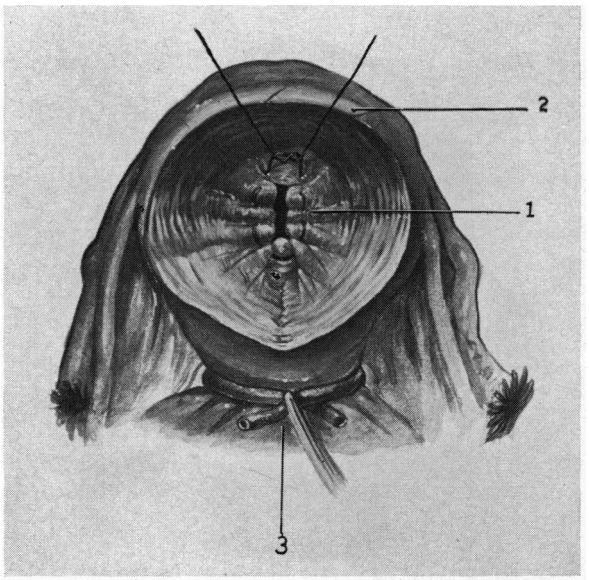

Figure 1.—Endometrial closure is facilitated by the blue-stained endometrium. (1) Usually, a purse-string suture is sufficient. (2) Hood of outer myometrium along with intact serosal surface that surrounded nest of myomata. (3) Uterine tourniquet in place. It consists of a thin soft rubber catheter that was passed through the avascular space of the broad ligament at the level of the internal os. The free ends had been stretched taut and crossed. A hemostatic clamp has been applied to the point of crossing to hold the tourniquet snugly in place.

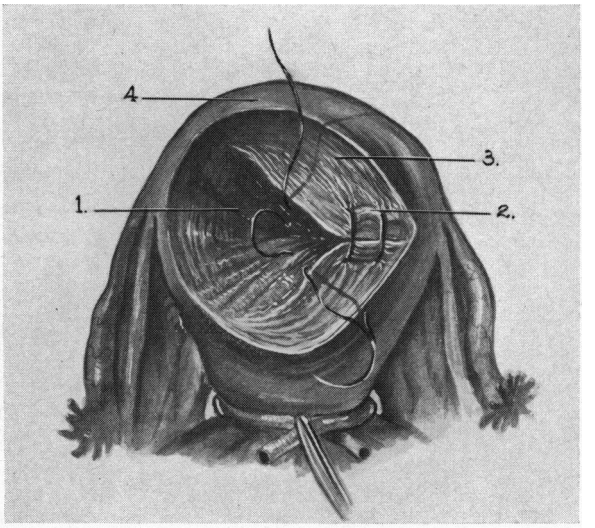

Figure 2.—First overlapping lamination of myometrium. (1) The inner myometrial layer above the closed endometrial wound is brought down over and past the endometrial closure and coapted to the inner myometrium below by interrupted sutures. (2) A second layer of uterine muscle from above has been dissected free and is now being anchored below by interrupted sutures. (3) Mass of hypertrophic uterine muscle which surrounded fibromyomata. (4) Hood of salvaged portion of outer myometrium.

disease before laparotomy is begun. This step seems unnecessary, however, if the extensive studies that should have been done previously, especially endometrial biopsy and Papanicolaou smears, have been evaluated.

B. *Intra-uterine Instillation of Methylene Blue Solution*

Just before laparotomy, under proper asepsis, an intrauterine Jarcho cannula is locked in place and 5 to 10 cc. of 1 per cent aqueous methylene blue in saline solution is injected slowly into the uterine cavity. If the dye flows easily, the cannula is withdrawn in one or two minutes. If not, 5 to 15 cc. of saline solution is injected through the cannula with moderate pressure, back flow being prevented by locking the two-way stop-cock after each 2 to 3 cc. As the epithelium will remain intensely blue for about two hours, the lumen of the uterus and tube will be outlined distinctly during the operation. If the tubal fimbriae are deeply stained and free, the surgeon knows the tube is patent.[1]

Preliminary instillation of methylene blue is heartily recommended, since it is so essential to know accurately where the endometrium is during myometrial reconstruction. Identification of the uterotubal lumen is equally important, lest it be inadvertently closed in the process of repair. Further,

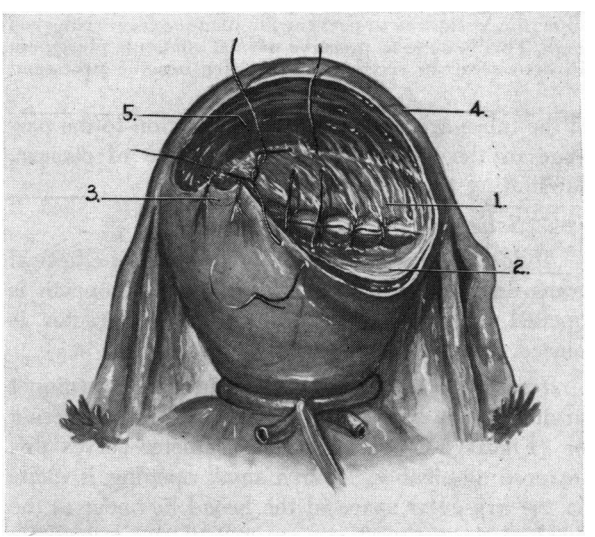

Figure 3.—Second overlapping lamination of myometrium. (1) Approximate site of closed endometrial wound which is now covered by the first overlapping lamination of uterine muscle. Compare this with sagittal section in Figure 5. (2) The middle layer of myometrium from the anterior uterine wall has been developed by careful dissection so as to make it more pliable. (3) The middle and outer thirds of the myometrium of the anterior uterine wall below the myometrial wound are being anchored to the base of the hood of myometrium. Usually, two layers are necessary, especially in the central portion. (4) Hood of myometrium with intact peritoneal surface. (5) Hypertrophic and excessive myometrium which surrounded the fibromyomata.

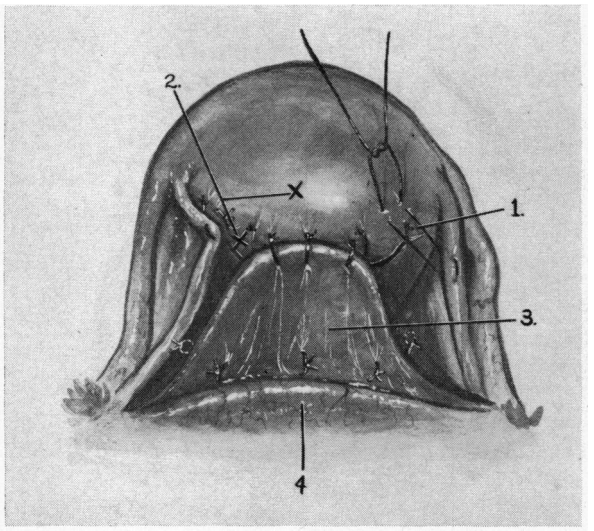

Figure 4.—Third overlapping lamination of myometrium. The salvaged hood of the outer third or so of myometrium with its intact peritoneal surface has been brought down over the first two laminations. (1) The round ligaments are utilized to provide peritoneal covering for the outer corners of the hood of myometrium. (2) The outer edges are shown tacked down with interrupted sutures. (3) The lower edges of the tacked down myometrial hood are faintly visible through the small piece of uterovesical peritoneum which had been dissected free previously, and is here shown anchored high on the new anterior uterine wall. (4) The edge of the empty urinary bladder is shown. Note that just above are three interrupted sutures to prevent the bladder from rising too high. This is done to preserve normal anatomic placement in case cesarean section should later become necessary.

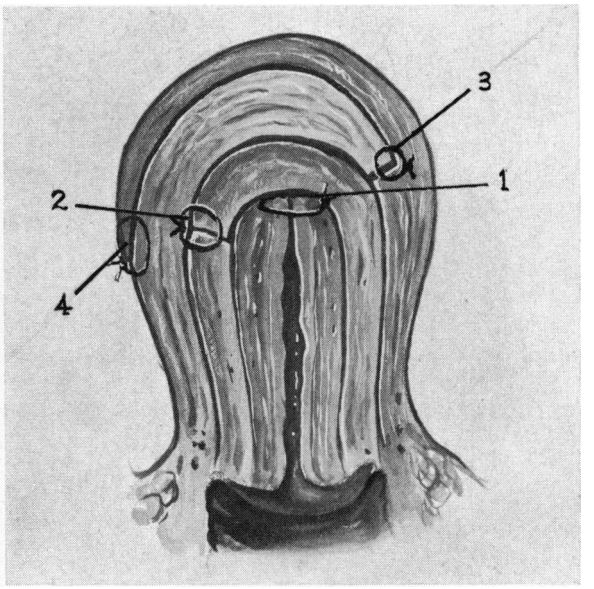

Figure 5.—Schematic representation of myometrial reconstruction utilizing overlapping laminations of myometrium. (1) The endometrial cavity has been closed. (2) The first overlapping myometrial lamination has been brought down over the endometrial wound and snugly coapted to the inner third of the anterior wall of myometrium. (3) The second overlapping myometrial lamination has been developed from the anterior uterine wall, brought up and over the endometrial wound and then anchored to the base of the salvaged hood of the outer third of myometrium. (4) The hood of myometrium with its intact peritoneal surface has been brought down and over the first two overlapping laminations of myometrium, and the outer edges tacked down with interrupted sutures. With completion of this step, the endometrial wound has been reinforced with three intact overlapping layers of myometrium. (Note: Reconstructed anterior uterine wall is on the left.)

if the tubes are not open, the obstruction to the passage of the dye will identify the site of closure, facilitating tubal plastic procedures.

C. *Salient Points of Myomectomy*

Abdominal opening. Usually a sweeping elliptical transverse incision is best. After the peritoneum is opened, a quadrilateral self-retaining retractor is placed, freeing both the assistant's hands.

Hemostasis is best accomplished by a tourniquet around the uterus at about the level of the internal os (Figure 1). A soft rubber catheter serves this purpose admirably. After a small opening is made in the avascular space of the broad ligament at the level of the internal os, one end of the catheter is pulled through. A similar procedure is carried out on the opposite side. The ends of the catheter are tautly crossed and a small hemostatic clamp is applied at the point of crossing. In some situations, it is better to clamp the crossed portions of the catheter on the posterior surface of the uterus. The tourniquet is left in place for the duration of the procedure, since intra-uterine blood flow is decidedly reduced, although not completely stopped. A small amount of blood comes into the myometrium through the utero-ovarian anastomosis. Some surgeons prefer to release the catheter at 10 to 20 minute intervals for 30 seconds or so. I do not consider it necessary.

As an alternative, the Bonney myomectomy clamp may be used, although it tends to be cumbersome. It should be noted that Bonney[1] leaves the clamp on for the duration of the procedure.

Single incision on the anterior wall. There are very few myomata that are not accessible through such an incision. A transverse incision across the anterior uterine surface is preferable, but the conditions observed at operation will determine the direction of the single linear incision into the anterior surface of the corpus.

Careful gentle dissection. With proper hemostasis, there is absolutely no need to sacrifice gentleness and deliberate careful dissection for speed.

Preservation of serosal surface of myometrium. It is essential that the outer myometrium and its peritoneal surface be preserved as intact as possible at all times. Only after the second layer of myometrium has been developed and anchored in place

(Figure 3) should excision of excess myometrium be considered.

Direct inspection of the endometrial cavity (and curettage, if necessary) is absolutely essential. If the cavity had not been opened before, it should be deliberately cut into before myometrial reconstruction is begun. All polyps are removed onto a sterile towel. Curettage should be done if the blue stained endometrium appears hyperplastic or atypical.

With one finger in the endometrial cavity, counter pressure with the other hand or a thumb may often bring to light a small submucous myoma or one situated deep in the myometrium. The myometrium should thus be explored carefully and deliberately in search for tumors. This maneuver does not introduce infection.

III. Myometrial Repair

A. *Preservation of Endometrial-Tubal Continuity*

Before the myometrial repair is started, the location and integrity of the uterotubal junction must be ascertained. If there is any question, a fine probe may be placed in the tubal opening until that area is carefully sutured. When the endometrial cavity is closed, the probe is removed. Closure should be done with interrupted sutures of fine catgut (such as triple zero, 21-day chromic catgut) on a medium to large round-pointed needle.

B. *Steps in Improved Myometrial Reconstruction Utilizing Technique of Overlapping Laminations of Myometrium*

Closure of endometrial cavity (Figure 1) may usually be accomplished by a purse-string suture (Figure 5) or interrupted figure 8 sutures. (The identifying blue dye in the endometrium facilitates this step.) If the endometrial cavity appears too large, an oval shaped portion may first be removed.[2]

First overlapping myometrial lamination (Figure 2). The inner layer of myometrium above the closed endometrial opening is brought down over it and anchored in place with simple interrupted or figure 8 sutures (Figure 5). Occasionally, two layers of sutures are needed. Frequently this layer of muscle may have to be freed for the purpose with the dissecting scissors. As a rule, it should be about 0.5 to 1.0 cm. thick.

Since extreme care is necessary not to tie off the uterotubal lumen at the lateral corners, the suturing there should be done first, with the stitches very close together and accurately placed in the myometrium.

Second overlapping myometrial laminations (Figure 3). The outer myometrium on the anterior surface of the uterus (the portion below the original transverse incision) is then brought up and over the site of the endometrial wound and anchored at the base of the hood of myometrium which had covered the fundal myoma. If necessary, this portion of the myometrium may have to be freed or loosened with the dissecting scissors. Usually, two layers of sutures are necessary to anchor it securely to the base of the myometrium above the wound. In this manner, a second intact layer of uterine muscle is made to overlap the closed endometrial incision (Figure 5). Following this step, the tourniquet is loosened for one minute and hemostasis checked for adequacy.

After this layer has been completed, considerable judgment must be exercised by the surgeon. When reconstructed the uterus should be no larger than it would be at six weeks' gestation. Accordingly, if considerable hypertrophy of the myometrium has taken place about the myomata, a certain amount of the middle muscular layer of myometrium may need to be excised. Usually, the excessive portion is located at the upper portion of the corpus (Figure 2). With experience, the amount necessary is easily determined. For the neophyte, it is suggested that small amounts be trimmed off in layers of about 0.5 cm. until the right amount has been removed. Care should be exercised to make the corpus as symmetrical as possible, using the uterine insertion of the round ligaments as guide points.

There is a difference of opinion on the question of whether reduction in size of the corpus uteri is necessary. Bonney[2] expressed belief that if it is not reduced, subinvolution and menorrhagia are much more likely to develop. Rubin,[4] Louros[3] and other investigators have said that the uterus will eventually involute to or near to the normal size as it does following pregnancy. Without attempting to resolve this difference of opinion, it can be pointed out that reduction in the size of the uterus as outlined above is simple and safe and it does greatly lessen the risk of excessive menstrual bleeding.

Development of third overlapping myometrial layer (Figure 4). Upon completion of the second lamination, the hood of myometrium that covered the fundal myoma is stretched taut over the previous layers and tacked down as far as possible on the anterior uterine wall with interrupted sutures. This reinforces the uterine incision with a third intact layer of myometrium (Figure 5). The tourniquet is again loosened to be sure that hemostasis is complete, then is removed.

(*Note:* The same method of overlapping layers of myometrium may be used for closing a vertical uterine incision on either the anterior or posterior wall. However, the layers are overlapped vertically instead of horizontally, a much more difficult procedure.)

Providing peritoneal covering. The round ligaments may be used to cover raw surfaces at the cor-

ners. In the central portion, a layer of vesicouterine peritoneum may be dissected free and brought up to cover the edge of the brim of the hood. If this is done, it is advisable to place three interrupted sutures just above the level of the empty bladder to prevent it from riding high onto the corpus.

On the posterior surface of the corpus, the ovary may be anchored over a high uterine incision. If the incision is low, the peritoneum over the uterosacral ligaments may be used to cover the wound. If there are numerous incisions on the posterior surface, then the large bowel may be anchored to it; a piece of omentum may be dissected free and held in place with interrupted sutures; or, best of all, a large piece of dry Gelfoam® may be used to cover the raw surfaces, a few well placed sutures holding it in place. The holes in the broad ligament are closed with purse string sutures from the anterior surface.

Temporary one-point suspension of the uterus was performed in over half of the 61 cases in which the operation here described was used. This is accomplished by passing a nylon or dermal suture, size 0, through the anterior superior surface of the uterus. The ends, which are left long and untied, are passed out through the incision. When the skin edges are closed, the loose ends are tied snugly, but not tightly, over a four-fold piece of gauze. After normal bowel function has been established, usually on the third postoperative day, one side is cut and the suture is removed.

The temporary one-point suspension serves two purposes. First, when the uterus is held up in this manner, there is no vascular congestion and thus less chance of oozing. Second, if abdominal distention does occur, there is far less chance of adhesions of small bowel to the anterior uterine surface.

In some cases, a modified Gilliam suspension was utilized for a more permanent form of uterine suspension.

NOTES ON RESULTS

Between 1946 and 1958, the techniques described were used in 61 infertile women with significant myomata uteri. Forty (65.7 per cent) conceived, while 27 women (44.3 per cent of the total) went to term one or more times. Some 75 per cent were delivered vaginally. Several were given very dilute Pitocin® intravenously for dilatory labor. The principal indications for cesarean section were contracted or borderline pelvis, breech presentation, active labor for 12 hours with no progress and primiparity after age 36. One patient was delivered, in another city, of an 8-pound baby presenting by breech after 36 hours of good active labor.

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